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A Revision of *Micronecta* of Australia and Melanesia (Heteroptera: Corixidae)¹

By

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INTRODUCTION

It has been more than 40 years since the publication of Hale's (1922) paper, "Studies in the Australian Aquatic Hemiptera." There has been no other work concerning the *Micronecta* of the Australian region except one on the Melanesian species by Wróblewski (1962), which contains redescrptions of two species and a statement on the synonymy of another.

The structural differences among species in the genus have been more fully recognized in recent decades. It is, therefore, necessary to redescribe those species which have not been reviewed since Hale's work. Besides redescrptions, eight new species and a key to the Australian and Melanesian species of *Micronecta* are included in this paper. Kirkaldy described three species from Australia, but unfortunately only one has been recognized for certain, and his type specimens cannot be located. The original descriptions of his two unrecognized species are reproduced verbatim.

I wish to express my appreciation to all who have assisted me in this study. Dr. H. B. Hungerford placed at my disposal all the *Micronecta* in the Snow Entomological Museum plus some types lent from the Hungarian National Museum and the undetermined *Micronecta* that had been sent to him from the following museums: British Museum (Natural History), California Academy of Science, Chicago Natural History Museum, Hungarian National Museum, Museum of Comparative Zoology (Harvard University), South Australian Museum, and the United States National Museum. Dr. C. D. Michener and Miss Ellen Ordway have helped in revising the manuscript.

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KEY TO THE *MICRONECTA* OF AUSTRALIA AND MELANESIA (MALES)

1. Male genitalia with sinistral asymmetry; free lobe of eighth tergite with two outer, lower and upper, setigerous angles (Fig. 14) *M. sinistra*
Male genitalia with dextral or sinistral asymmetry; free lobe of eighth tergite only with outer, lower, setigerous angle 2
2. Body less than 2.5 mm. long 3
Body more than 2.5 mm. long 5
3. Interocular space as wide as an eye or narrower 4
Interocular space wider than an eye; parameres as in Figs. 52-53
..... *M. australiensis*
4. Clavus with three dark stripes; interocular space narrower than an eye *M. ludibunda*
Clavus with two dark stripes; interocular space about as wide as an eye; parameres as in Figs. 1-4 *M. micra*
5. Body 3.5 mm. to 5 mm. long 6
Body 2.5 mm. to 3.5 mm. long 7
6. Vertex roundly produced; palal claw with one margin greatly expanded as in Fig. 44 *M. robusta*
Vertex conically produced; palal claw elongate (Fig. 36) *M. major*
7. Hemelytra of uniform color 8
Hemelytra with dark maculations 9
8. Hemelytra black *M. carbonaria*
Hemelytra yellowish brown; parameres as Figs. 80-82 *M. windi*
9. Corium with many diffuse blotches centrally; pronotum with a distinct ridge behind posterior margin of head; parameres as in Figs. 58-60 *M. carinata*
Corium with four broken, dark, longitudinal stripes; pronotum without a distinct ridge behind posterior margin of head 10
10. Interocular space about 1.60 times as wide as an eye; middle femur long, about 41% of the body length *M. virgata*
Interocular space less than 1.55 times as wide as an eye; middle femur less than 40% of the body length 11
11. Free lobe of eighth tergite with inner angle obsolete and outer angle distinctly prolonged, completely margined with bristle-like hairs as in Fig. 78 12
Free lobe of eighth tergite with a well developed inner angle and an outer setigerous angle as in Fig. 28 13
12. Second hair of the posterior lower flexor margin of pala slightly enlarged, palal claw with a distinct notch distally (Fig. 79); parameres as in Figs. 73-75 *M. queenslandica*
No special enlarged hair on the posterior flexor margin of pala, palal claw completely margined *M. quadristrigata*
13. Palal claw with one margin greatly expanded (Fig. 29); parameres as in Figs. 24-25 *M. gracilis*

- Palar claw evenly expanded (Fig. 72) 14
14. Distal end of palar claw swollen (Fig. 72); parameres as in Figs. 65-68 *M. halei*
- Distal end of palar claw normal (Fig. 23) 15
15. Vertex strongly produced, head as long as (macropterous form) or longer (brachypterous form) than pronotum; parameres as in Figs. 16-19 *M. batilla*
- Vertex slightly produced, head shorter than pronotum; parameres as in Figs. 45-47 *M. adelaidae*

Micronecta micra Kirkaldy

Micronecta micra KIRKALDY, 1905, p. 26; HALE, 1922, p. 328.

Size. Brachypterous form, length 1.9 mm. to 2.0 mm.

Color. Yellowish brown, pattern in seven specimens studied almost completely effaced. Venter and legs grayish yellow.

Structural characteristics. Head about twice as long as pronotum, vertex roundly produced in front of eyes; interocular space about as wide as eye; length to width of pronotal disk as 1.5:5.5, lateral margins of pronotum very short, making head almost contiguous with corium, posterior margin of pronotum almost truncate. Hemelytra with numerous minute setae. Wings reduced, extending to third abdominal tergite. Prestrigilar flap (fig. 5) broad and short with round tip. Submedian process of seventh abdominal sternite (fig. 6) broad basally, abruptly pointed at tip, with four extremely elongate, enlarged bristles subbasally. Free lobe of eighth tergite (fig. 7) with large, round inner angle and rather small, pointed, setigerous outer angle, posterior margin between angles slightly concave. Parameres well chitinized and shaped as in Figs. 1-4. Foreleg similar to that of *M. australiensis*.

Remarks. Kirkaldy's types are unknown, but the Snow Entomological Museum has seven specimens, two males and five females, from the type locality, Kuranda, northern Queensland. These specimens agree well with the original description, especially considering the body size and posteriorly truncated pronotum.

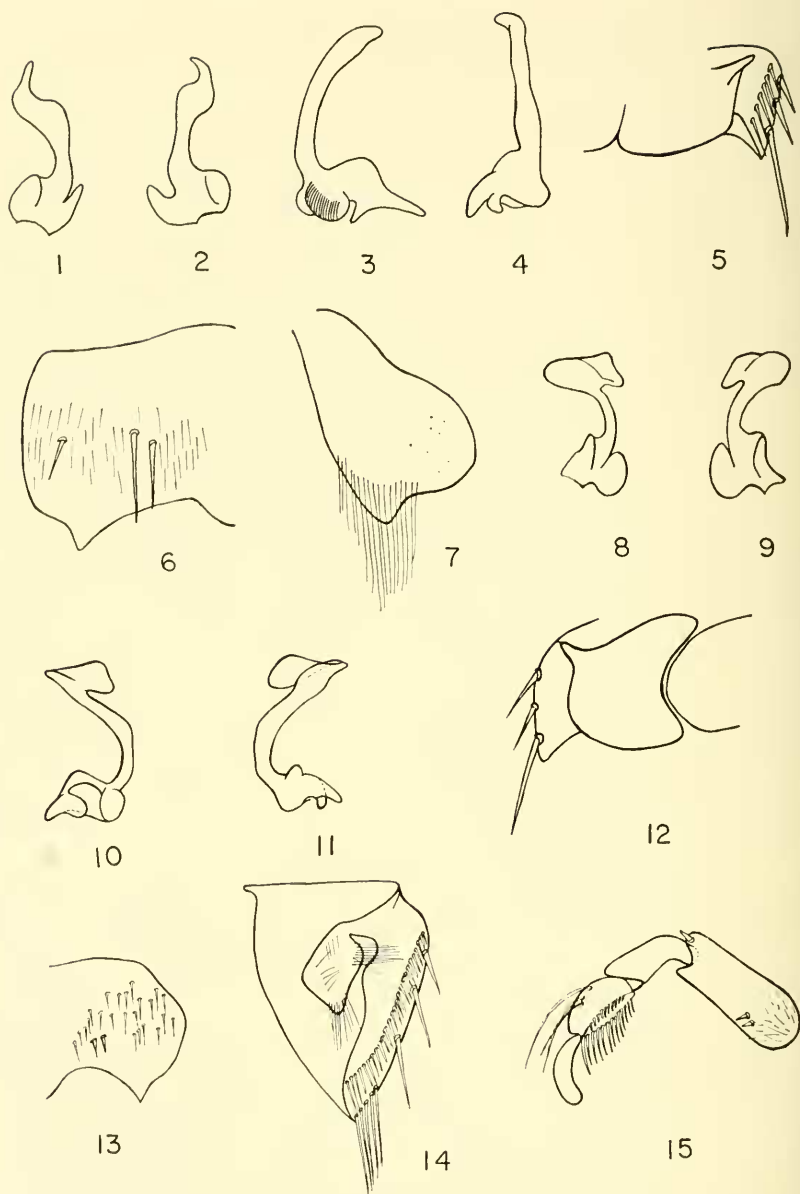
Collection data. Two males and five females, Kuranda, northern Queensland, Aug. 12, 1938 (R. G. Wind).

Micronecta batilla Hale

Micronecta batilla HALE, 1922, p. 323.

Size. Macropterous form, length 2.8 mm. to 3.3 mm. Brachypterous form, length 2.6 mm. to 3.1 mm.

Color. Grayish or yellowish to dark brown; vertex sometimes uniformly colored, usually with three parallel, reddish, longitudinal stripes. Pattern on hemelytra as in *M. robusta*. Venter and legs usually pale.



FIGS. 1 TO 7. *M. micra*. 1-2, left paramere; 3-4, right paramere; 5, prestigilar flap; 6, submedian process of seventh abdominal sternite; 7, free lobe of eighth abdominal tergite. FIGS. 8 TO 15. *M. sinistra*. 8-9, left paramere; 10-11, right paramere; 12, prestigilar flap; 13, submedian process of seventh abdominal sternite; 14, free lobe of eighth abdominal tergite; 15, foreleg of male.

Structural characteristics. Head about one and one half times as long as pronotum, width to length of pronotal disk as 3.1:0.9 in brachypterous form. In macropterous form, head as long as pronotum, width to length of pronotal disk as 3.3:1.2. Vertex noticeably produced beyond anterior margins of eyes, more so in brachypterous form. Interocular space as wide as eye or slightly wider; posterior margin of pronotum rounded. Hemelytra with scattered minute hairs. In brachypterous form, wings extending to seventh abdominal tergum. Prestrigilar flap (fig. 20) and submedian process of seventh abdominal sternite (fig. 21) similar to those of *M. robusta*. Free lobe of eighth tergite (fig. 22) with well developed rounded inner angle and slightly produced setigerous outer angle. Right paramere (fig. 19) slightly dilated before tip and gradually narrowed to apex; left paramere (figs. 16-18) denticulate with many small conical barbs, broad basally and constricted distally to bent apex. Foreleg (fig. 23) as in *M. robusta* but the spines on tibia uniform in size and palar claw dilated evenly.

Remarks. In the original description, the variation of body size of this species is indicated as 2.75 mm. to 5 mm. In view of the strong similarities between *M. batilla* and *M. major* n. sp., it seems that the large individuals of Hale's *M. batilla* actually were *M. major*. I have examined more than 250 specimens, including syntypes of *M. batilla*, and find no intergradation with *M. major*.

Collection data. *South Australia:* Adelaide (identified by H. M. Hale). *Victoria:* Bacchus Marsh, Jan., 1904. *New South Wales:* Pine Island, Federal Capital Territory (J. W. Evans); Mt. Kosciusko, 5-7000 ft., Dec. 13, 1931 (P. J. Darlington, Harvard Exp.); Dorriggo, 3000 ft., Feb., 1932; Valley Heights, near Katoomba, May 23, 1954 (E. S. Brown). *Queensland:* Brisbane, Dec., 1932 (H. Hacker); Fresh Water Creek, Redlynch, Sept. 27, 1938 (R. G. Wind). *Western Australia:* Yancheyarra, June 24, 1933 (N. B. Tindale). *Tasmania:* Lake Leake, 1937 (J. W. Evans).

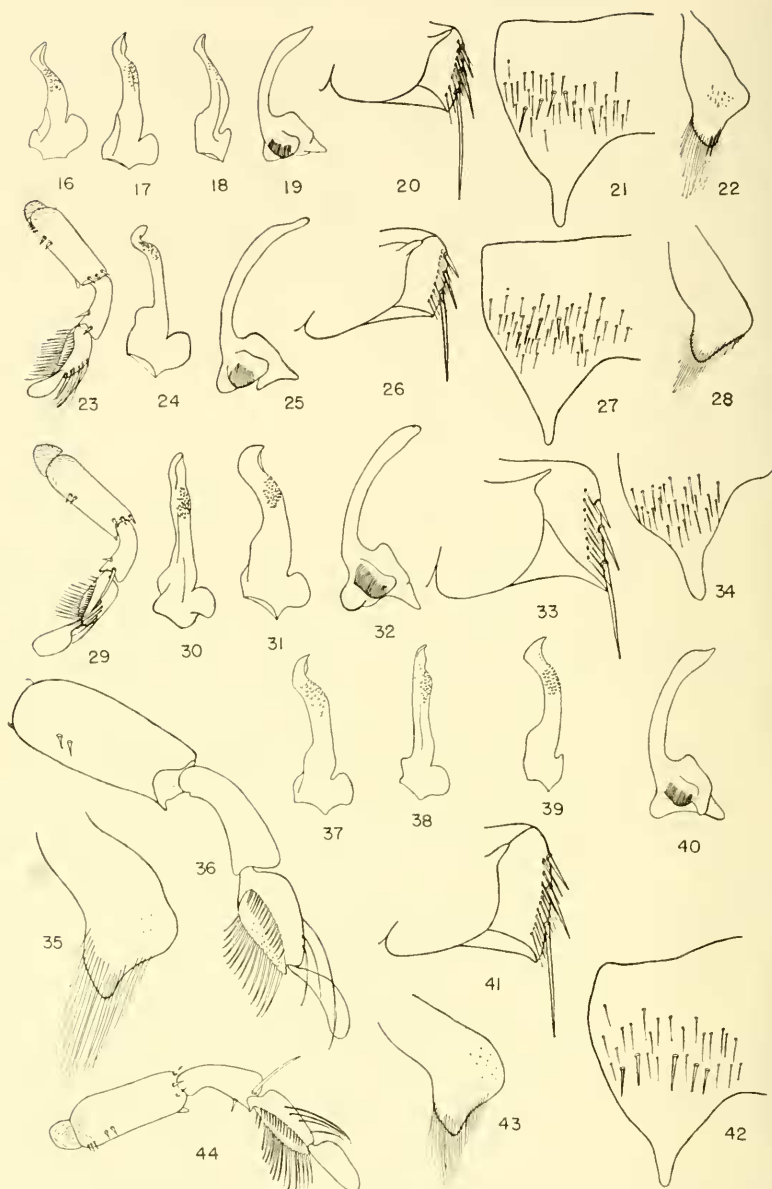
Micronecta gracilis Hale

Micronecta gracilis HALE, 1922, p. 326.

Size. Macropterous form, length, 3.26 mm. to 3.53 mm.

Color. Grayish to dull brown; vertex much lighter than rest of body, with dark central stripe; pattern of pronotum and hemelytra as in *M. robusta*. Venter and legs pale.

Structural characteristics. Body elongate, length more than twice as long as widest part (3.4:1.5). Head shorter than pronotum (1.2:1.4), vertex slightly produced beyond anterior margins of eyes; interocular space wider than eye (1.5:1.3); width to length of pronotal disk as 3.4:1.4; pronotum spindle shaped. Hemelytra with relatively long, fine hairs. Prestrigilar flap



FIGS. 16 TO 23. *M. barilla*. 16-18, left paramere; 19, right paramere; 20, prestigilar flap; 21, submedian process of seventh abdominal sternite; 22, free lobe of eighth tergite; 23, foreleg of male. FIGS. 24 TO 29. *M. gracilis*. 24, left paramere; 25, right paramere; 26, prestigilar flap; 27, submedian process of seventh abdominal sternite; 28, free lobe of eighth tergite; 29, foreleg of male. FIGS. 30 TO 36. *M. major*. 30-31, left paramere; 32, right paramere; 33, prestigilar flap; 34, submedian process of seventh abdominal sternite; 35, free lobe of eighth tergite; 36, foreleg of male. FIGS. 37 TO 44. *M. robusta*. 37-39, left paramere; 40, right paramere; 41, prestigilar flap; 42, submedian process of seventh abdominal sternite; 43, free lobe of eighth tergite; 44, foreleg of male.

of fifth tergum (fig. 26) broad and short. Subequilateral, submedian process of seventh sternite with six slightly enlarged bristles subbasally (fig. 27). Free lobe of eighth tergite with well developed postero-external setigerous and antero-internal rectangular angles (fig. 28). Right paramere (fig. 25) evenly curved, narrowing distally to blunt tip; left paramere (fig. 24) with middle part of shaft almost straight, distal part sharply curved in sickle-shape, denticulate beyond two parts. Palar claw (fig. 29) as in *M. robusta* Hale.

Remarks. The redescription is based on syntypes and specimens identified by Hale. This species, in general appearance, is close to *M. quadristrigata* Breddin. However, in the denticulate left paramere, the characteristic palmar claw and the submedian process of the seventh sternite, *M. gracilis* seems more closely allied to *M. robusta*.

Collection data. *South Australia:* Quorn (A. H. Elston) (syntype); Myponga (A. H. Elston) (syntypes); Neales River at Algebuckina, May 10, 1953 (R. A. Stirton and R. H. Tedford) Lake Callabonna, June 3, 1953 (R. A. Stirton and R. H. Tedford); White Crossing, Coopers Creek, June 18, 1953 (R. A. Stirton); Mt. Serle, N. Flinder Range (Hale and Tindale); Well 4 m. E. Oraparinna (at light), Feb. 1956 (G. F. Gross); Everard Ranges (A. Brumby). *Queensland:* Cairns district (A. M. Lea); Kings Creek, Aug. 25, 1954 (R. A. Stirton); St. George, 1923 (G. H. Wilkins). *New South Wales:* Carabatta, Sydney, Jan. 31, 1958 (M. J. Nikitin); Bogan River (Mr. Beane); Valley Heights, near Katoomba, May 23, 1954. *Western Australia:* 20 m. South of Erlinda Station, Oct. 23, 1953 (N. B. Tindale); Yeeda Station, Aug. 25, 1953 (N. B. Tindale); Warburton Ranges (A. Brumby). *Victoria* (no detailed data on specimens).

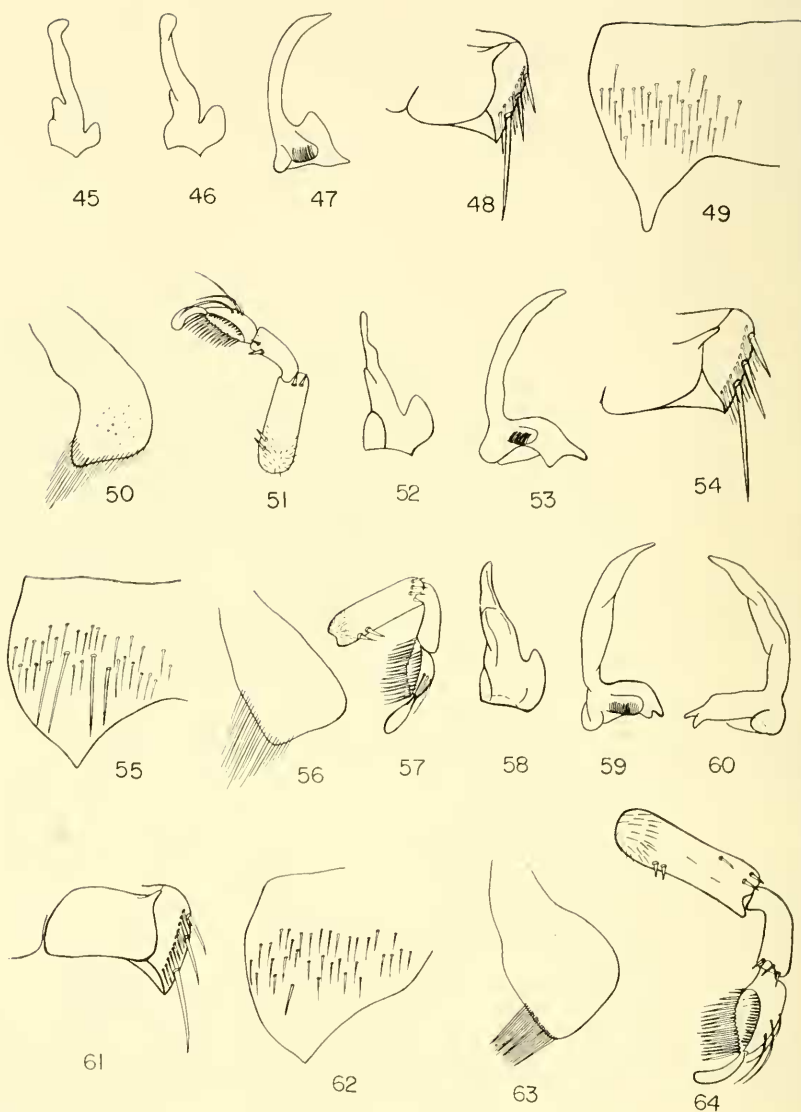
Micronecta robusta Hale

Micronecta robusta HALE, 1922, p. 325.

Size. Macropterous form, length 3.5 mm. to 4.2 mm.

Color. Head pale to dark brown either with uniform color throughout or with a central longitudinal yellowish brown stripe, sometimes with light spot between eye and central stripe. Pronotum and hemelytra usually much darker than head, pronotum crossed by a pronounced, broken, transverse band visible only in specimens with light background. Clavus margined with stripe along inner and outer edges and corium marked with four longitudinal broken stripes. Venter and legs grayish yellow to grayish fuscous.

Structural characteristics. Body stout, length less than twice as long as widest part (4.2:2.0); head noticeably shorter than pronotum; vertex not produced but rounded in front of eyes; interocular space broad, usually one and one half times as wide as an eye; width to length of pronotal disk as 4.2:1.5; many specimens with posterior margin of pronotum, in front of



FIGS. 45 TO 51. *M. adclaidae*. 45-46, left paramere; 47, right paramere; 48, prestrigular flap; 49, submedian process of seventh abdominal sternite; 50, free lobe of eighth tergite; 51, foreleg of male. FIGS. 52 TO 57. *M. australiensis*. 52, left paramere; 53, right paramere; 54, prestrigular flap; 55, submedian process of seventh abdominal sternite; 56, free lobe of eighth tergite; 57, foreleg of male. FIGS. 58 TO 64. *M. carinata*. 58, left paramere; 59-60, right paramere; 61, prestrigular flap; 62, submedian process of seventh abdominal sternite; 63, free lobe of eighth tergite; 64, foreleg of male.

scutellum, somewhat straight. Hemelytra shiny and smooth, with numerous hairs. Prestrigilar flap broad and short (fig. 41). Submedian process of seventh abdominal sternite well produced, with four to six enlarged bristles subbasally (fig. 42). Free lobe of eighth tergite (fig. 43) as in *M. major*. Right paramere (fig. 40) distinctly dilated just before tip and suddenly constricted distally; left paramere (figs. 37-39) somewhat straight at middle, bent toward pointed apex. Femur of foreleg (fig. 44) with two spinelike setae on lower side and three apical spinelike hairs near outer margin; tibia with large apical spine on inner margin and subapical spine on flexor margin; palmar claw greatly dilated near base.

Remarks. This redescription is based on eight specimens from Murray Bridge, South Australia, which were determined by Dr. Hale, and on the syntypal specimens which I have also examined. In addition, more than 150 specimens of this species from various places were studied. The large body size and the shape of the free lobe of the eighth tergite are similar to those of *M. major* but they differ in the relative sizes of the interocular space and the eye, the shape of the palmar claw, and the genitalia.

Collection data. *South Australia:* Adelaide (H. M. Hale); Murray Bridge. *Western Australia:* Seaforth, June, 1952 (Mrs. B. Y. Main); Rott-nest Island, near Perth, Oct. (P. J. Darlington, Harvard Exp.); Mt. Sterling, Aug. 19, 1957 (J. A. L. Watson); Bickley Swamp, Sept. 29, 1954 (E. P. Hodgkin). *New South Wales:* Carbramatta, Sydney, Feb., 1958 (M. J. Nikitin); Pine Island, near Canberra, Fed. Cap. Terr. (J. W. Evans); Valley Heights, near Katoomba, May 23, 1954. *Tasmania:* Hobart, April, 1937 (J. W. Evans).

Micronecta adelaidae n. sp.

Size. Macropterous form, length 2.5 mm. to 2.7 mm.

Color. General coloration dark; head yellow with three contrasting parallel, longitudinal, brown stripes on vertex, one median, other two close to inner margin of each eye; pronotum, scutellum and hemelytra brown, with pattern of hemelytra as in *M. batilla* but broken stripes on corium more pronounced. Venter and legs yellowish gray.

Structural characteristics. Head shorter than pronotum, vertex slightly produced in front of eyes; posterior margin of eyes approximate posterior margin of head; interocular space about one and one-thirds times as wide as an eye; length to width of pronotal disk as 1.1:2.8; pronotum spindle shaped, with anterior and posterior margins rounded. Hemelytra shiny and smooth, with sparsely scattered, fine, short hairs. Prestrigilar flag as in Fig. 48. Submedian process of seventh sternite (fig. 49) moderately produced, apex blunt. Free lobe of eighth tergite as in Fig. 50. Right paramere (fig. 47) evenly

curved and pointed apically; left paramere (figs. 45-46) smooth with knob-like expanded apex. Foreleg (fig. 51) as in *M. carinata*.

Comparative notes. In general appearance, this species is similar to *M. queenslandica*, but *M. adelaidae* has a narrower interocular space. The well sclerotized left paramere of *M. adelaidae* is similar to those of *M. windi* and *M. halei*.

Holotype. Male, Adelaide River 70 mi. South of Darwin, Northern Territory, Mar. 25, 1954 (B. Malkin) in the United States National Museum.

Allotype. Female, same data as for holotype.

Paratypes. One female and two males with same data as above, one male in the United States National Museum, and one male and one female in the Snow Entomological Museum of The University of Kansas.

Micronecta australiensis n. sp.

Size. Brachypterous form, length 2.03 mm. to 2.33 mm.

Color. Light to dark brown, pattern partially or completely effaced; when present, masculations as in *M. batilla*. Head, legs and thoracic venter usually pale; abdominal venter usually black.

Structural characteristics. Head longer than pronotum, vertex rounded in front of eyes; interocular space wider than eye (3.1:2.2); width to length of pronotal disk as 6.5:1.4; posterior margin of pronotum almost straight; pronotum, scutellum and hemelytra slightly rugulose, hemelytra with scattered pale hairs. Wings reaching sixth abdominal tergum. Prestrigilar flap (fig. 54) and submedian process of seventh sternite (fig. 55) both similar in outline of those of *M. micra*. Free lobe of eighth tergite (fig. 56) with rounded, setigerous inner angle, rectangular outer angle, posterior margin between angles almost straight. Right paramere (fig. 53) simply curved to blunt point; left paramere (fig. 52) styliform, unevenly narrowed toward blunt point. Foreleg as in Fig. 57.

Comparative notes. This species is similar in general appearance and structure to *M. micra*, but differs in the body size, the relative sizes of the interocular space and the eye, and the genitalia.

Holotype. Male, Federal Capital Territory (near Canberra), Australia, Mar. 25, 1931 (J. Evans) in the Snow Entomological Museum of The University of Kansas.

Allotype. Female, same data as for holotype.

Paratypes. Nineteen males and twenty-two females, same data as holotype; one male, Alexandra, Victoria, F. L. Billinghamurst, all in the Snow Entomological Museum of The University of Kansas, except three males and three females in the South Australian Museum.

Micronecta carinata n. sp.

Size. Brachypterous form, length 2.5 mm. to 2.6 mm.

Color. Ground color of dorsum yellow to light brown, with dark brown maculations; head with a central longitudinal stripe on vertex; pronotum without maculations; clavus with irregular dark blotches basally and distally; corium with four longitudinal broken stripes, tending to fuse near center. Venter and legs dull gray.

Structural characteristics. Head longer than pronotum, vertex roundly produced in front of eyes; pronotum with noticeable ridge, along hind margin of head; interocular space narrow but slightly wider than eye (2.8:2.7); width to length of pronotal disk as 7.2:1.9; posterior margin of pronotum somewhat straight or hardly curved. Hemelytra with relatively long and dense hairs. Wings reaching seventh abdominal tergum. Prestrigilar flap (fig. 61) about twice as wide as long. Submedian process of seventh sternite (fig. 62) broad basally and gradually narrowing to short, acute point, without enlarged bristles subbasally. Free lobe of eighth tergite (fig. 63) with distinct, round inner angle, rectangular outer angle with numerous long bristles uniformly arranged along lower exterior margin. Right and left parameres broadly styliform and somewhat twisted (figs. 58-60). Foreleg as in Fig. 64.

Comparative notes. *M. carinata* differs from other Australian species in having four central, fused, broken, longitudinal stripes on the hemelytra, and in the broadly styliform parameres of the male. These distinct characteristics indicate that *M. carinata* is a specialized species.

Holotype. Male, Dorrigo, New South Wales, Australia (J. P. Darlington) in the Museum of Comparative Zoology (Harvard University).

Allotype. Female, same data as holotype.

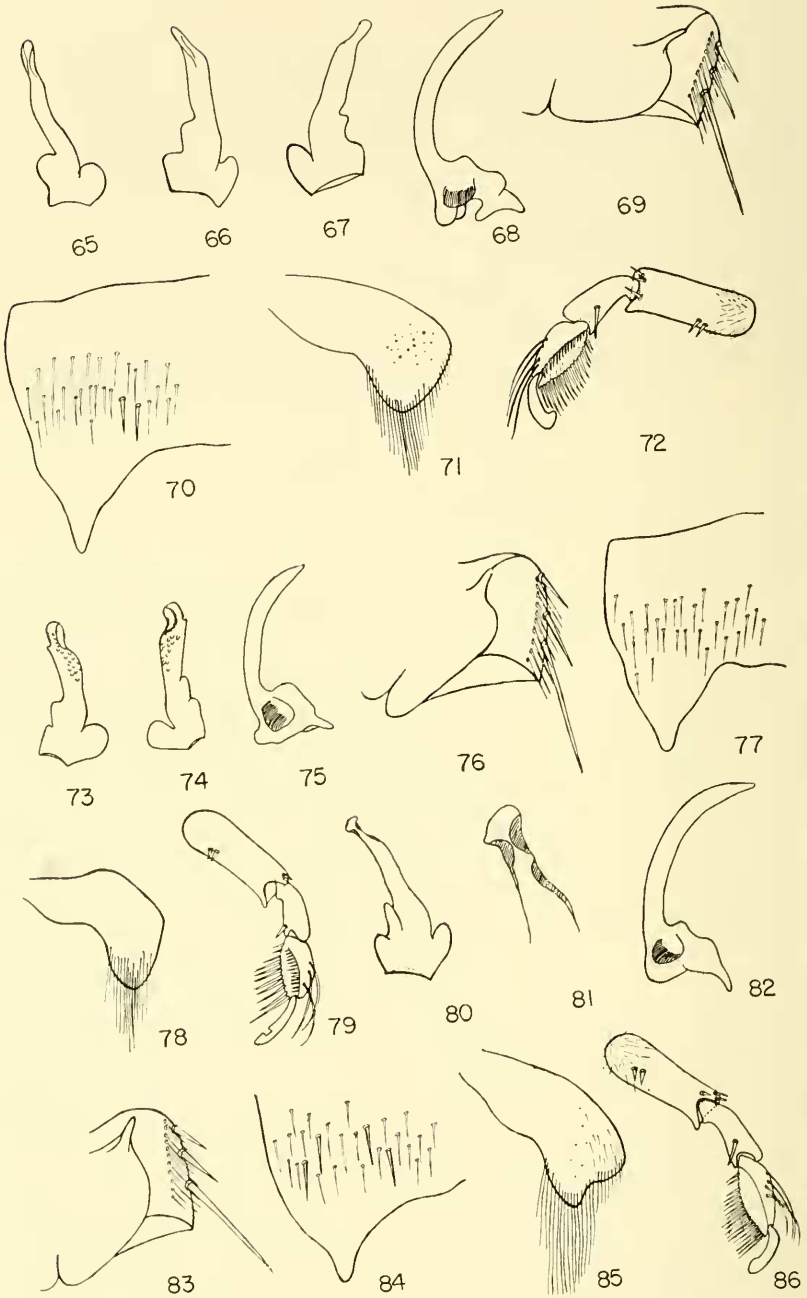
Paratype. One female, same data as holotype, in the Snow Entomological Museum of The University of Kansas.

Micronecta halei n. sp.

Size. Macropterous form, length 3.0 mm. to 3.3 mm.

Color. Dorsum generally yellowish brown, usually without color pattern, or with one transverse band on pronotum and four broken longitudinal stripes on corium. Venter and legs lighter than dorsum.

Structural characteristics. Body elongate, length more than twice greatest width (5.0:2.2); head shorter than pronotum, vertex roundly produced beyond eye margins; interocular space slightly wider than eye (3.5:3.2); width to length of pronotal disk as 8.6:3.3; pronotum spindle shaped. Hemelytra with sparsely scattered fine hairs. Prestrigilar flag as in Fig. 69. Submedian process of seventh abdominal sternite (fig. 70) moderately produced, apex



FIGS. 65 TO 72. *M. halei*. 65-67, left paramere; 68, right paramere; 69, prestrigilar flap; 70, submedian process of seventh abdominal sternite; 71, free lobe of eighth tergite; 72, foreleg of male. FIGS. 73 TO 79. *M. queenslandica*. 73-74, left paramere; 75, right paramere;

subacute, with four enlarged bristles subbasally. Free lobe of eighth tergite (fig. 71) with rounded inner angle and rather prominent setigerous outer angle. Right paramere (fig. 68) simply curved and pointed; left paramere (figs. 65-67) without denticulations, broad basally and twisted slightly toward narrow distal part. Palar claw (fig. 72) elongate and expanded apically.

Comparative notes. In general appearance, *M. halei* has no specific diagnostic feature. However, the sclerotized paramere and the shape of the submedian process of the seventh abdominal sternite indicate a close alliance to *M. windi*, from which *M. halei* differs in the twisted distal end of the left paramere and the expanded tip of the palar claw.

Holotype. Male, De Grey at Yarrrie Station, Western Australia, July 10, 1953 (N. B. Tindale) in the South Australian Museum.

Allotype. Female, same data as holotype.

Paratypes. Three males and twenty females, same data as holotype. One male and twelve females in the South Australian Museum and two males and eight females in the Snow Entomological Museum of The University of Kansas.

Micronecta queenslandica n. sp.

Size. Macropterous form, length 2.6 mm. to 3.0 mm.

Color. Grayish brown above and pale yellow below. Ground color of vertex mostly grayish yellow contrasting with three parallel longitudinal reddish brown stripes arranged as in *M. batilla*; pattern on pronotum and hemelytra as in *M. robusta* but lighter. Venter of thorax and abdomen yellowish, slightly suffused with gray. Legs mostly yellow, darker on tarsi.

Structural characteristics. Head shorter than pronotum; vertex rounded beyond anterior margins of eyes; interocular space slightly wider than eye (3.5:3.2); width to length of pronotal disk as 8.7:3.0; posterior margin of pronotum somewhat straight in front of scutellum. Hemelytra shiny and smooth, with numerous fine, rather long hairs. Prestrigilar flap (fig. 76) narrow and elongate, unlike those of most other Australian species. Submedian process of seventh sternite (fig. 77) slightly prolonged, without enlarged bristles subbasally. Free lobe of eighth tergite (fig. 78) with inner angle obsolete, outer angle distinctly prolonged and completely margined with bristles. Right paramere (fig. 75) arcuate with pointed apex; left paramere (figs. 73-74) somewhat straight, denticulate with a few conical barbs, ventral margin of distal part with shallow depression, rounded apically. Palar claw with distinct notch (fig. 79).

76, prestrigilar flap; 77, submedian process of seventh abdominal sternite; 78, free lobe of eighth tergite; 79, foreleg of male. Figs. 80 to 86. *M. windi*. 80-81, left paramere; 82, right paramere; 83, prestrigilar flap; 84, submedian process of seventh abdominal sternite; 85, free lobe of eighth tergite; 86, foreleg of male.

Comparative notes. The unusually shaped palar claw and the prominent prestrigilar flap as well as the remarkable free lobe of the eighth tergite of the male distinguish this species. The denticulate left paramere seems to indicate a close alliance to *M. virgata*, although *M. queenslandica* has the general facies of *M. adelaidae*.

Holotype. Male, northern Queensland, Australia, Marshall Laird, June, 1954, in the Snow Entomological Museum of The University of Kansas.

Allotype. Female, same data as holotype.

Paratypes. Five males and three females, same data as holotype; one male and three females, Townsville, northern Queensland, Australia, 1920 (G. H. Hill), in the Snow Entomological Museum of The University of Kansas except one male and two females in the South Australian Museum.

Micronecta major n. sp.

Size. Macropterous form, length 4.6 mm. Brachypterous form, length 4 mm.

Color. Medium to light brown, lineations on hemelytra as in *M. robusta* but more distinct. Venter and legs uniformly yellowish.

Structural characteristics. In brachypterous form, head longer than pronotum (1.4:1.2), width to length of pronotal disk as 3.7:1.2. In macropterous form, head as long as pronotum, width to length of pronotal disk as 4.2:1.5. Vertex strongly produced beyond anterior margins of eyes; interocular space as wide as eye or slightly wider; pronotum rounded at posterior margin. Hemelytra shiny with numerous fine hairs. Wings reaching eighth abdominal tergite in brachypterous form. Prestrigilar flap (fig. 33) broad and short, with rounded apex. Submedian process of seventh sternite (fig. 34) pro-longer to blunt point, without enlarged bristles subbasally. Free lobe of eighth tergite as in Fig. 35. Right paramere (fig. 32) evenly curved and rounded apically; left paramere stout, slightly curved and denticulate with many conical barbs (figs. 30-31). Femur of foreleg (fig. 36) with two spine-like setae on lower side, palar claw elongate.

Comparative notes. The general appearance of this species and, particularly, the distinctly produced vertex and the relative sizes of the interocular space and the eye, are similar to those of *M. batilla*, but *M. major* differs from *M. batilla* in the parameres, which have a stouter shaft and a rounded distal end, and in the larger body size.

Holotype. Male, Coolabah, New South Wales, Nov. 15, 1900 (W. Froggatt) in the Hungarian National Museum, Budapest.

Allotype. Female, same data as for holotype.

Paratypes. Four females, two in the Hungarian National Museum, Budapest and two in the Snow Entomological Museum of The University of Kansas.

Micronecta windi n. sp.

Size. Macropterous form, length 2.9 mm.

Color. Yellowish brown throughout, pattern completely faded.

Structural characteristics. Head about as long as pronotum, vertex triangularly produced in front of eyes; interocular space wider than eye (3.8:2.9); pronotum spindle shaped; width to length of pronotal disk as 8.0:3.0. Hemelytra shiny and smooth, with sparsely scattered hairs. Prestrigilar flap as in Fig. 83. Submedian process of seventh sternite (fig. 84) noticeably prolonged, with four enlarged bristles subbasally. Free lobe of eighth tergite (fig. 85) with well developed inner rounded angle and pointed setigerous outer angle, posterior margin between angles concave. Right paramere (fig. 82) arcuate, gradually narrowing toward distal point; left paramere (figs. 80-81) slightly curved, free portion emarginate ventrally, distal margin somewhat folded. Palar claw elongate and slightly expanded apically (fig. 86).

Comparative notes. The color pattern of the two available specimens is completely effaced. *M. windi* has the general facies of *M. gracilis* except the former is much smaller. *M. windi* is also similar to *M. halei*; the chief differences are cited under that species.

Holotype. Male, Kuranda, northern Queensland, Australia, Aug. 12, 1938 (R. G. Wind) in the Snow Entomological Museum of The University of Kansas.

Paratype. One male, same data as holotype.

Micronecta sinistra n. sp.

Size. Macropterous form, length 1.7 mm.

Color. Medium brown, head yellowish, pronotum and hemelytra darker; pattern almost completely effaced except for one dark stripe running along outer margin of corium. Venter blackish.

Structural characteristics. Head about as long as pronotum; vertex moderately produced in front; interocular space wider than eye (0.8:0.7). Hemelytra smooth and shiny, with scattered very fine hairs, almost invisible. Abdomen with usual asymmetry reversed, having strigil on the left. Submarginal bristles on left side of fifth abdominal tergite absent (as in most species of *minutissima* group), tergite and prestrigilar flap as in Fig. 12. Submedian process of seventh sternite (fig. 13) broad basally and pointed distally, with four slightly enlarged bristles subbasally. Free lobe of the right, eighth tergite (fig. 14) different from that of dextral species, having two outer, lower and upper, setigerous angles and one inner rounded angle. Right and left parameres (figs. 8-11) similar, free portions curved and well chininized with extremely expanded distal lobe. Foreleg as in Fig. 15.

Comparative notes. The single specimen has sinistral abdominal asymmetry, which deviates from other species of *Micronecta*, but has been recorded once before by Wróblewski (1962) who described a sinistral male individual of *M. quadristrigata* Breddin from Viet-Nam. *M. sinistra* might represent an independent offshoot from the original stock of *Micronecta* because the structural characteristics of the male parameres and the free lobe of the eighth tergite show many differences from other *taxa*.

Holotype. Male, Astrolabe Bay, Stephansort, New Guinea (Biró 97), in the Hungarian National Museum, Budapest.

NOTES ON ADDITIONAL SPECIES

Micronecta annae Kirkaldy

Micronecta annae KIRKALDY, 1905, p. 262.

On the basis of the original description, copied below, it is impossible to recognize this species:

"*M. annae* sp. n.—Head pallid. Pronotum dark fuscous brown, with darker transverse median line. Tegmina fuscous brown (the margins of the areas narrowly darker), somewhat superficially punctured. Head a little longer than pronotum, rounded in front. Pronotum elongate elliptical, lateral margins very short, much less than half the width of the posterior margin of an eye. Mesoxiphus acutely triangular. Terminal segment of antenna elongate, somewhat thickened. Intermediate femur equal in length to tibia, tarsus and claw together; tarsus one-half longer than a claw, which is equal in length to the tibia, subcostal furrow much as in *M. vanduzeei*. Length $3\frac{1}{4}$ mm.

"Australia, Victoria (my collection)."

Micronecta annae Kirkaldy var. *Pallida* Kirkaldy

Micronecta annae KIRKALDY var. *pallida* KIRKALDY, 1907, p. 788.

Recognition of a variety of any *Micronecta* species on the basis of coloration alone, without discussion of the individual variation within the species, seems unacceptable. The following is a copy of the original description:

"*M. annae* Kirkaldy var. *pallida* nov.

No transverse line on pronotum; tegmina with a pale castereous basal band.

"Hab.—Q.: Kuranda (Aug.;Perkins)."

Micronecta erato Kirkaldy

Micronecta erato KIRKALDY, 1905, p. 263.

The original description of this species is mostly based on coloration and almost agrees with all the Australian *Micronecta*. Kirkaldy did give certain

structural information on *M. erato* (head, pronotum and body size) which suggests *M. batilla*, but this synonymy is still far from established. The following is a copy of the original description:

"*M. erato* sp. n.—Head and underside pale stramineous. Pronotum pale sordid yellow, with a broad blackish brown median transverse stripe which does not reach the lateral margins. Tegmina sordid stramineous; clavus with two narrow dark brown lines running parallel to interior and corial margins, uniting at the apex of clavus. Corium with two elongate suboval areas narrowly dark-brown-bordered, and the exterior lateral margins also brownish black. Pronotum, scutellum and tegmina somewhat superficially punctured. Head rounded in front, longer than the pronotum; lateral margins of pronotum obsolescent; membrane apically angulate. Length about 3 mm.

"Australia, Victoria (my collection)."

Micronecta carbonaria Horvath

Micronecta carbonaria HORVATH, 1904, p. 595; WRÓBLEWSKI, 1962b, p. 319.

Among the materials lent from the National Hungarian Museum, Budapest, is a specimen of *M. carbonaria* bearing a type label beside the collection label (Berlinhafen, Lemien, New Guinea, 1896 (Biró), although Horvath did not designate a type specimen in his original description. Since Wróblewski recently (1962b) has given a complete description of this species based on the materials from the type series, redescription is not necessary here. Because of the similarities of the parameres, free lobe of eighth tergite, and the paler claw of the foreleg, *M. carbonaria*, *M. virgata* and *M. batilla* seem to be closely related species.

Collection data. Berlinhafen, Lemien, New Guinea, 1896 (Biró) Type; Sepik River, New Guinea (K. P. Schmidt).

Micronecta ludibunda Breddin

Micronecta ludibunda BREDDIN, 1905, p. 57; CHEN, 1960b, p. 115; WRÓBLEWSKI, 1962b, p. 323.

Micronecta inconspicua LUNDBLAD, 1933, p. 96.

Micronecta striatella LUNDBLAD, 1933, p. 98.

Micronecta graphiptera HORVATH, 1918, p. 146.

One female type of *M. graphiptera* from the Hungarian National Museum, Budapest, is available for this study; it confirms Wróblewski's statements (1962b) that *M. graphiptera* is a synonym of *M. ludibunda*.

M. ludibunda is a widely spread species, known from Thailand, Sumatra, New Guinea and the Solomon Islands.

Micronecta quadristrigata Breddin

Micronecta quadristrigata BREDDIN, 1905, p. 57; LUNDBLAD, 1933, p. 87; HUTCHINSON, 1940, p. 376; WRÓBLEWSKI, 1960, p. 301; WRÓBLEWSKI, 1962a, p. 176.

Micronecta minthe DISTANT, 1910, p. 347.

Two specimens, one male and one female, labelled Astrolabe Bay, Stephansort, New Guinea (Biró 97) from the Hungarian National Museum belong to this species. The male is 2.4 mm. and female 2.5 mm. long; most other features of these two specimens agree well with the previous descriptions by Lundblad, Hutchinson, and Wróblewski except for the relative widths of the interocular space and the eye. The ratio of the interocular space to an eye, in the New Guinea specimens, is 1.03, smaller than the same ratio for specimens from Hong Kong and Celebes (Wróblewski, 1960).

Micronecta quadristrigata, because of many unusual morphological structures, was considered a primitive species by Wróblewski, 1960. In 1962, he found one aberrant male from Viet-Nam that showed sinistral abdominal asymmetry. In my opinion, this is additional evidence of the primitiveness of this species. Another species from New Guinea, *M. sinistra*, also has the abdomen sinistrally asymmetrical; at the same time it has many primitive structures such as the undifferentiated, enlarged bristles on the seventh abdominal sternite (fig. 13) and parameres (figs. 8-11) as in some *Tenagobia* species (Deay, 1935). The left and right parameres of *M. sinistra* both have a narrow median shaft and a large expanded lobelike distal end which is almost as large as the basal end, while most other *Micronecta* species have a stout shaft, narrower or pointed distal end, and a broad base. It is possible that dextral and sinistral asymmetrical forms were both common in the early members of this genus. Through the long course of the evolution the most favored form, in this case the dextral, has become dominant. Since only two sinistrally asymmetrical specimens are known (the type of *M. sinistra* and the aberrant *M. quadristrigata*), they may be phylogenetic relics.

In 1962, Wróblewski placed *M. quadristrigata* in a new monotypic subgenus *Sigmonecta*, based on the sigmoid shape of the free lobe of eighth tergite. However, *M. queenslandica* of Australia and *M. eupompe* Hutchinson (1930) of Abyssinia also have such a characteristically shaped free lobe. Yet there is no other structure which shows their affinity. The left parameres of the three species (often used for indicating phyletic relationships among species of *Micronecta*) are strongly different. It seems doubtful that the sigmoid free lobe of eighth tergite alone can have much value for establishing a subgenus.

Micronecta virgata Hale

Micronecta virgata HALE, 1922, p. 327; WRÓBLEWSKI, 1962b, p. 320.

This species is very easy to distinguish from other Australian taxa since it

has the largest ratio of the interocular space to the eye width and the longest middle femur of all the known Australian species. After comparing the female syntype from the South Australian Museum with other specimens listed in the following paragraph, I found no special difference between them. In 1962, Wróblewski redescribed this species from specimens from the Solomon Islands; therefore, a redescription is omitted here.

Collection data. *Queensland*: Carins district (A. M. Lea) (syntype); Townsville, 1920 (G. F. Hill); Townsville, March, 1932 (P. J. Darlington, Harvard Expedition). *Solomon Islands*: Russell Island, Ufa, Sept. 1955 (E. S. Brown); San Cristobal, Ugi, April, 1955 (E. S. Brown).

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